PATENT APPLICATION
Mo7059
LeA 33,071

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF	)	
	)	GROUP NO.: 1795
HORST BERNETH ET AL	)	
	)	
SERIAL NUMBER: 10/089,358	)	EXAMINER: Martin J. Angebranndt
	)	
FILED: May 13, 2002	)	Confirmation No.: 1359
	)	
TITLE: METHOD FOR DIGITALLY AND OPTICALLY STORING DATA	)	

APPEAL BRIEF
UNDER 37 C.F.R. §1.192

Assistant Commissioner for Patents
Alexandria, Virginia 22313-1450
Sir:

The present Appeal Brief is submitted in support of the Notice of Appeal filed December 5, 2008. A separate Petition for Extension of Time is being filed simultaneously herewith.

I. REAL PARTY IN INTEREST

The real party in interest for the present Application Serial No. 10/089,358 is Bayer Aktiengesellschaft, of Leverkusen, Germany, by virtue of the assignment executed March 1, 2002, March 4, 2002, March 6, 2002, March 8, 2002 and March 18, 2002.

II. RELATED APPEALS AND INTERFERENCES

On December 5, 2008, a Notice of Appeal was filed in Application Serial No. 10/089,358. There are no pending appeals or interferences of which Appellants are aware that would be affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Appellants herewith appeal the final rejection of Claims 1-5, 7-9, 12-24, and 27-30. Claims 1-5, 7-9, 12-18, 29 and 30 are pending and stand rejected. Claims 6, 10, 11, 25 and 26 have been canceled. Appellants acknowledge that Claims 19-24, 27 and 28 have been withdrawn. A complete copy of the appealed claims is set forth in the Appendix. Claims 1-5, 7-9, 12-18, 29 and 30 are the subject of this Appeal Brief.

IV. STATUS OF AMENDMENTS AFTER FINAL

No Amendment under 37 CFR §1.116 has been filed in the instant application following the Request for Continued Examination filed July 23, 2007.

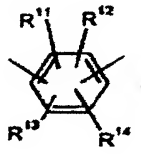
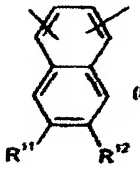
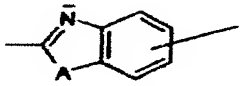
V. SUMMARY OF CLAIMED SUBJECT MATTER

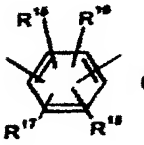
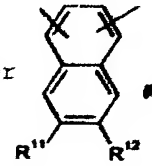
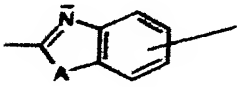
As recited in independent Claim 1, the present invention relates to a process for the optical writing and optical reading of digital information in a two-dimensional extended storage medium ***(found at page 4, lines 19-20)***, the process comprising the steps of: 1) modifying by optical writing the surface topography of a storage medium so that a depression of at least 10 nm and a width, measured on the original surface, of less than 10 µm is achieved in one direction ***(found at page 4, lines 21-23 and page 43, lines 22-23)***, wherein the writing is carried out using a focused laser beam with an energy density of a light pulse between 1 mJ/cm^2 and 100 J/cm^2 ***(found at page 45, line 8)*** and with an intensity of between 0.15 mW and 100 mW ***(found at page 42, line 23)***, and 2) optically reading the digital information on the storage medium by detecting changes in the surface topography ***(found at page 39, lines 20-23)***, wherein the reading is carried out with an optical imaging system which can detect interference between beam portions originating from parts of the scanned sample spot lying at different depths ***(found at page 39, lines 29-31)***, and wherein as light-active polymer films side-chain polymers, optionally block

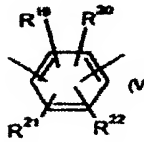
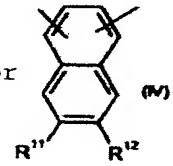
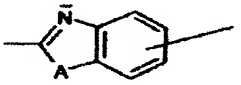
polymers and/or graft polymers are used ***(found at page 5, lines 28-31)***, to which dyes are bound as side chains via a STQ-spacer (formula I) ***(found at page 6, lines 23-24)*** and dimensionally anisotropic groups are likewise bound via a STQ-spacer (formula II) ***(found at page 10, lines 1-4)***, wherein formula I has the structure

$$—S^1—T^1—Q^1—X^{1'}—Ar^1—(—X^{2'}—Ar^2—)_y—\ (—X^{3'}—Ar^3—)_z—X^4 \qquad (I)$$

(found at page 6, lines 25-30)

where -Ar¹- =  (III) or  (IV) or  (V)

where -Ar²- =  (VI) or  (IV) or  (V)

where -Ar³- =  (VII) or  (IV) or  (V)

(found at page 7, lines 1-20)

in which

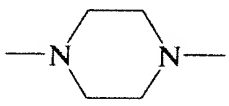
y denotes 1 or 2 ***(found at page 7, line 29)***,

z denotes 0, 1 or 2 ***(found at page 7, line 31)*** and

$X^{2'}$ and Ar^2 and/or $X^{3'}$ and Ar^3 may have different meanings, if y and/or z denote 2 ***(found at page 8, lines 1-2)***,

A denotes O, S or N-C_1- to C_4-alkyl ***(found at page 8, line 4)***,

Q^1 denotes -O-, -S-, -(N-R^5)-, -C(R^6R^7)$_p$, -(C=O)-, -(O-CO)-, -(NR^5-CO)-, -(SO_2)-, -(O-SO_2)-, -(NR^5-SO_2-)-, -(C=NR^8)-, -(CNR^8-NR^5)-, -O-C_6H_5-COO- or a bivalent radical of the formula



(found at page 8, lines 6-14)

T^1 denotes $-(CH_2)_p-$, wherein the chain may be interrupted by -O-, $-NR^9-$, or $-OSiR^{10}{}_2O-$ and may be substituted by methyl ***(found at page 8, lines 16-17)***,

S^1 denotes a direct bond, -O-, -S- or $-NR^9-$ ***(found at page 8, line 19)***,

P denotes an integer from 2 to 12, preferably 2 to 8, in particular 2 to 4 ***(found at page 8, line 21)***,

R^9 denotes hydrogen, methyl, ethyl, or propyl ***(found at page 8, line 23)***,

R^{10} denotes methyl or ethyl ***(found at page 8, line 24)***,

R^{11} to R^{22} independently of one another denote hydrogen or a non-ionic substituent, ***(found at page 8, line 27)***

X^4 denotes hydrogen, halogen, cyano, nitro, CF_3, CCl_3, $-COO-C_1-$ to C_4-alkyl or $X^{4'}-R^4$ ***(found at page 8, lines 29-30)***,

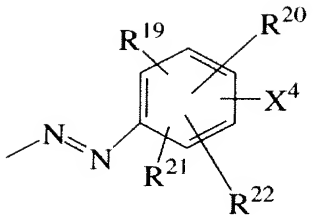
$X^{1'}$, $X^{2'}$ $X^{3'}$ and $X^{4'}$ denote a direct bond, -O-, -S-, $-(N-R^5)-$, $-C(R^6R^7)-$, -(C=O)-, -(CO-O)-, $-(CO-NR^5)-$, $-(SO_2)-$, $-(SO_2-O)-$, $(SO_2-NR^5)-$, or $-(CNR^8-NR^5)-$ ***(found at page 8, line 31 to page 9, line 1)*** and

$X^{2'}$ and $X^{3'}$ may in addition denote $-(C=NR^8)-$, -(N=N)- and at least one of the groups $X^{2'}$or $X^{3'}$ denotes -N=N- ***(found at page 9, lines 4-5)***,

R^4, R^5, R^6, R^7 and R^8 independently of one another denote hydrogen, C_1- to C_4-alkyl, or C_6- to C_{10}-aryl ***(found at page 9, lines 7-8)*** and

R^4 and R^5 in addition independently of one another denote C_1- to C_{20}-alkyl-(C=O)-, C_3- to C_{10}-cycloalkyl-(C=O)-, C_2- to C_{20}-alkenyl-(C=O)-, C_6- to C_{10}-aryl-(C=O), C_1- to C_{20}-alkyl-(SO_2)-, C_3- to C_{10}-cycloalkyl-(SO_2), C_2- to C_{20}-alkenyl-(SO_2)- or C_6- to C_{10}-aryl-(SO_2), ***(found at page 9, lines 10-13)*** wherein

by the term non-ionic substituents are understood halogen, cyano, nitro, C_1- to C_{20}-alkyl, C_1- to C_{20}-alkoxy, phenoxy, C_3- to C_{10}-cycloalkyl, C_2- to C_{20}-alkenyl, C_6- to C_{10}-aryl, C_1- to C_{20}-alkyl-(C=O)-, C_6- to C_{10}-aryl-(C=O)-, C_1- to C_{20}-alkyl-(SO_2)-, C_1- C_{20}-alkyl-(C=O)-O-, C_1- to C_{20}-alkyl-(C=O)-NH-, C_6- to C_{10}-aryl-(C=O)-NH-, C_1- to C_{20}-alkyl-O-(C=O)-, C_1- to C_{20}-alkyl-NH-(C=O)-, C_6 to C_{10}-aryl-NH-(C=O)- or a radical of the formula



(VIII)

(found at page 9, lines 15-25)

and the alkyl, cycloalkyl, alkenyl and aryl radicals in turn may be substituted by up to 3 radicals from the group comprising halogen, cyano, nitro, C_1- to C_{20}-alkyl, C_1- to C_{20}-alkoxy, C_3- to C_{10}-cycloalkyl, C_2- to C_{20}-alkenyl or C_6- to C_{10}-aryl, and the alkyl and alkenyl radicals may be straight-chain or branched, ***(found at page 9, lines 27-29)*** and by the term halogen is understood fluorine, chlorine, bromine and iodine ***(found at page 9, lines 31-32)***, and formula II is described by

$$—S^1—T^1—Q^1—X^{1'}—Ar^1—(—X^{2'}—Ar^2—)_y— (—X^{3'}—Ar^3—)_z—X^4 \qquad (II)$$

wherein the above substituent definitions (formula I) are also valid for formula II, with the proviso that none of the groups $X^{2'}$ or $X^{3'}$ may denote -N=N- and R^{11} to R^{22} may not denote a radical of the formula (VIII) ***(found at page 10, lines 9-15)***.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1-4, 7-9, 12, 13, 15-18, 29 and 30 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by U.S. Pat. No. 4,666,819 issued to Elmasry and WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al., "Holographic Gratings in Azobenzene Side Chains Polymethyl-methacrylates", *Macromol.* Vol. 32(2) pp. 448-454 (01/1999), U.S. Pat. No. 4,366,545 issued to Howe et al. and U.S. Pat. No. 5,384,221 issued to Savant et al. With respect to this ground of rejection, Appellants admit that Claims 1-4, 7-9, 12, 13, 15-18, 29 and 30 stand or fall together.
2. Claims 1-5, 7-9, 12-18, 29 and 30 stand rejected under 35 U.S.C. §103(a) as being rendered obvious by U.S. Pat. No. 4,666,819 issued to Elmasry and WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al.,

WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al., "Holographic Gratings in Azobenzene Side Chains Polymethylmethacrylates", *Macromol.* Vol. 32(2) pp. 448-454 (01/1999), U.S. Pat. No. 4,366,545 issued to Howe et al. and U.S. Pat. No. 5,384,221 issued to Savant et al. further in view of U.S. Pat. No. 5,691,092 issued to Ninomiya et al. or EP 0,669,548 in the name of Akashi et al. With respect to this ground of rejection, Appellants admit that Claims 1-5, 7-9, 12-18, 29 and 30 stand or fall together.

VII. ARGUMENT

As will be set forth in detail below, Claims 1-4, 7-9, 12, 13, 15-18, 29 and 30 are not rendered obvious by U.S. Pat. No. 4,666,819 issued to Elmasry and WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al., "Holographic Gratings in Azobenzene Side Chains Polymethylmethacrylates", *Macromol.* Vol. 32(2) pp. 448-454 (01/1999), U.S. Pat. No. 4,366,545 issued to Howe et al. and U.S. Pat. No. 5,384,221 issued to Savant et al. Further, Claims 1-5, 7-9, 12-18, 29 and 30 are not rendered obvious by U.S. Pat. No. 4,666,819 issued to Elmasry and WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al., "Holographic Gratings in Azobenzene Side Chains Polymethylmethacrylates", *Macromol.* Vol. 32(2) pp. 448-454 (01/1999), U.S. Pat. No. 4,366,545 issued to Howe et al. and U.S. Pat. No. 5,384,221 issued to Savant et al. further in view of U.S. Pat. No. 5,691,092 issued to Ninomiya et al. or EP 0,669,548 in the name of Akashi et al. Accordingly the rejections under 35 U.S.C. §103(a), should be reversed, and favorable action by the Board is respectfully requested.

A. The Rejection under 35 U.S.C. §103(a) as being rendered obvious by Elmasry and Berneth et al., in view of Andruzzi et al., Howe et al. and Savant et al. is Improper

Claims 1-4, 7-9, 12, 13, 15-18, 29 and 30 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 4,666,819 issued to Elmasry and WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al., "Holographic Gratings in Azobenzene Side Chains Polymethylmethacrylates", *Macromol.* Vol. 32(2) pp. 448-454 (01/1999), U.S. Pat. No. 4,366,545 issued to Howe et al. and U.S. Pat. No. 5,384,221 issued to Savant et al. As will be set forth below, Appellants submit that Claims 1-4, 7-9, 12, 13, 15-18, 29 and 30 are not

rendered obvious by the cited combination of art and the rejection should be reversed.

1. The Examiner's Rationale

The Examiner has alleged at page 3, paragraph numbered 6 of the Final Office Action mailed June 6, 2008 that,

> Berneth et al. WO 97/44365 teaches the use of laser powers of 10^3 to 10^7 mJ/m^2 (0.1-1,000 mJ/cm^2) with times of 10^{-15} to 10^{-3} second for writing patterns using polarized light. (page 5/lines 4-15). The spot sizes may be 10 nm to 20 microns (page 5/lines 17-19). Examples of useful dye include those disclosed on pages 6-20, which are pendent to the polymer backbone. Exemplified dyes are shown in the examples. The thickness of the layers may be 0.1-500 microns ([page 23/lines 24+). The use of these in holographic, analog or digital recording processes is disclosed. (24/26-25/20). In example 1, the polymer illustrated on page 27 is applied to a 2x2 cm glass plate by spin coating and pre-exposed using a light box for two hours (section 1.1, page 27). This was then inscribed using an argon ion laser operating at 280 mW with a laser spot size of 7-8 microns, an inscribing energy "E" of 10^6 mJ/m^2 (100 mJ/cm^2) at a scan rate of 23.8 m/sec (section 1.3, pages 28-29). The dyes are those embraced by the language on pages 7-21 describing pendant chromophores and anisotropic moieties.
>
> Elmasry '819 in example 9 has a glass substrate coated with aluminum and a polymeric azo dye having the structure shown is coated to a thickness of 0.15 microns. This is exposed to a laser modulated by an acousto-optic modulator. The exposure conditions are for beam diameters of 0.5 to 50 microns, with 1 micron or less being used in the examples. The scanning speeds result in 45-55 ns exposures and the laser output at the recording layer is 1-150 mW, preferably 2-25 mW as in the examples. (6/17-36). The readout of the deformation is optical (5/6 1-6/11). Sample 1 in table 1 describes an exposure of 0.01 ergs/dot (1 x 10^{-9} J/spot) which assuming a 1 micron spot size is 0.127 J/cm^2 at a laser power in the 2-25 mW range.
>
> Howe et al. '545 teaches thermal deformation of dye/binder recording media, where the pit depth is 55 nm (12/40-44). The media have a substrate coated with a reflective layer and a the dye/binder layer. as shown in figure 3. The use of $\pi/2$ pit depths is disclosed. (12/55-63)
>
> Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) teaches that the reordering of the azobenzene compounds formed from the monomers on page 448 can be used to form gratings with relief features in the 90-1340 nm range as evidenced in table 4 (page 453).

Savant et al. '221 in examples XIII-XX has a glass substrate and a polymeric azo dye coated to a thickness between 20- and 35 microns. This is exposed to a laser modulated by an electro-optic modulator which varies the polarization and is readout using polarized light and detecting the polarization of the reflected light.

It would have been obvious to one skilled in the art to one skilled in the art to modify the cited example of Berneth et al. WO/ 9744365 by adding a reflective layer as taught by Elmasry '819 and Savant et al. '221 and further to use modulation means, such as the acousto-optic modulator taught by Elmasry '819, in place of the EOM with a reasonable expectation of being able to record data and read it out using the techniques disclosed by Elmasry '8 19 and/or Savant et al. '221 with a reasonable expectation of successfully forming the recited depression based upon the teachings of Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) and Howe et al. '545.

Alternatively it would have been obvious to modify the cited examples 4 and 5 of Elmasry '819 which assuming a 1 micron spot size records at 0.127 J/cm^2 at a laser power of 20mW and reading the information by using the azobenzene polymers, such as those taught by Berneth et al. WO/ 9744365 with a reasonable expectation of forming features of -1 micron in diameter and depths of more than 10 nm based upon the teachings of Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999) and Howe et al. '545. Further it would have been obvious to use the readout processes taught by Elmasry '819 and/or Savant et al. '221

Elmasry '819, Savant et al. '221 and Howe et al. '545 teaches readout of deformation recorded media, with Elmasry '819 specifically relating to azo polymeric dyes. In addition the deformation by melting as taught by Elmasry '819 and Howe et al. '545, the orientation of the azobenzene will also contribute to the change in topography as taught by Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (0111999) which uses polymeric dyes similar to those of Berneth et al. WOI9744365 and contributions from birefringence as discussed by Berneth et al. WO/ 9744365. The chemistry is relatively unimportant, the (pendant) chromophore must absorb the light to cause the deformation and the polymer (binder or polymeric backbone) controls the sensitivity based upon the Tg of the resulting composition. The mode of readout discussed in the instant application is clearly discussed by Elmasry '819 and particularly Howe et al. '545, who teaches the use of interferometric thicknesses for the recording layer to optimize the contrast. If the applicant wants to limit the recording to optical profileometers, then the claims should state this. (see specification at page 39).

2. *The Claimed Process is Patentably Distinguishable From the Cited Combination of References*

The present invention is directed to a process of writing and reading of digital information on a suitable storage medium. The optical writing process of the present invention produces changes in the surface topography of the storage medium, due to the photo-induced configurational changes in the polymers. The optical reading is effected by detecting changes in the surface topography.

Elmasry, as has been argued before, describes a wholly different type of chemistry than that of the instantly claimed process, namely photochromic systems which produce reading signals via surface modifications. Elmasry describes quite generally the deformation of thermoplastics containing 1% dye. This deformation is identified in the examples by means of signal differences. It would not be clear to one of ordinary skill in the art whether these differences in the signals are merely due to deformation, i.e., surface modifications, or whether some are produced, for example, by irradiation with light. Thus, Elmasry fails to teach or suggest the instantly claimed invention. Further, Berneth et al. fails to provide the missing teaching or suggestion to lead one of ordinary skill in the art to the instant invention.

A key feature of the claimed process representing a clear departure from the teaching of Berneth et al relates to the type of the read-out signal. In accordance with the present invention, the signal relates to surface topography of the storage medium whereas the referenced signal (page 5, lines 21-23) of Berneth et al. is a double-refraction (birefringence) pattern. Berneth et al. fails to provide even a hint that the surface topography can be used for reading out the signals. Thus, Elmasry and Berneth et al. fail to teach or suggest the instantly claimed invention. Further, Appellants maintain that Andruzzi et al. fail to add the missing teaching or suggestion to remedy the deficiencies of either Elmasry and Berneth et al. to lead one of ordinary skill in the art to the instantly claimed invention.

To the reading of one of ordinary skill in the art, Andruzzi et al. disclose a holographic process for producing surface reliefs which is different from the present method for writing and rewriting (a binary pit-oriented data storage process). Thus, Elmasry, Berneth et al. and Andruzzi et al. fail to teach or suggest the instantly

claimed invention. Appellants assert that Howe et al. fail to add the missing teaching or suggestion to lead one of ordinary skill in the art to the instantly claimed invention.

Howe et al. fail to teach or suggest the specific process features of the inventive process (i.e., pre-exposure, read and writing energies, specific depression and polarization optic). Thus, Elmasry, Berneth et al., Andruzzi et al. and Howe et al. fail to teach or suggest the instantly claimed invention. Further, Appellants aver that Savant et al. fail to add the missing teaching or suggestion to lead one of ordinary skill in the art to the instantly claimed invention.

Savant et al. fail to disclose a read out by the local changes in the surface topography. Examples XIII to XX of Savant et al. disclose the birefringent recording process (col. 23, line 56, and col. 24 lines 17 and 18). Thus, Elmasry, Berneth et al., Andruzzi et al., Howe et al. and Savant et al. fail to teach or suggest the instantly claimed invention.

Therefore, the cited combination of references fails to render obvious Claims 1-4, 7-9, 12, 13, 15-18, 29 and 30 and the rejection under 35 U.S.C. §103(a) should be reversed.

B. The Rejection under 35 U.S.C. §103(a) as being rendered obvious by Elmasry and Berneth et al., in view of Andruzzi et al., Howe et al. and Savant et al. further in view of Ninomiya et al. or Akashi et al. is Improper

Claims 1-5, 7-9, 12-18, 29 and 30 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 4,666,819 issued to Elmasry and WO 97/44365 in the name of Berneth et al., in view of Andruzzi et al., "Holographic Gratings in Azobenzene Side Chains Polymethylmethacrylates", *Macromol.* Vol. 32(2) pp. 448-454 (01/1999), U.S. Pat. No. 4,366,545 issued to Howe et al. and U.S. Pat. No. 5,384,221 issued to Savant et al. further in view of U.S. Pat. No. 5,691,092 issued to Ninomiya et al. or EP 0,669,548 in the name of Akashi et al. As will be set forth below, Appellants submit that Claims 1-5, 7-9, 12-18, 29 and 30 are not rendered obvious by the cited combination of art and the rejection should be reversed.

1. The Examiner's Rationale

The Examiner has alleged at page 6, paragraph numbered 7 of the Final Office Action mailed June 6, 2008 that,

> Ninomiya et al. '092 teach LC recording layers provided on polymeric substrates (12/35-41). The overcoating of the LC polymers layer with a surface protective layer is disclosed to provide resistance to damage from abrasion, heat and the like (12/60-65). Useful materials for the surface protective layer include W curable resins and the like including various acrylates (13/1-58).
>
> Akashi et al. EP 669548 teaches in example 1, an LC materials applied to an A1 coated polyethylene substrate and overcoated with a UV curable layer. (pages 11-12.) The use of azo dyes is disclosed with respect to the formulae a-k and the fact that X and Y may be N=N as discussed in page 5. The use of azobenzene is also specifically described. On page 4 at line 26. Useful protective layers are described. (9/6-9).
>
> It would have been obvious to one skilled in the art to modify the media rendered obvious by the combination of Elmasry '819 and Berneth et al. WO/ 9744365, with Andruzzi et al., "holographic gratings in azobenzene side chains polymethylmethacrylates", Macromol. Vol. 32(2) pp. 448-454 (01/1999), Howe et al. '545 and Savant et al. '221 by adding a protective layer know to be useful with LC materials, such as those disclosed by Akashi et al. EP 669548 or Ninomiya et al. '092 with a reasonable expectation of forming a useful azo based LC recording medium which is protected from mechanical damage. Further it would have been obvious to use other substrate materials, such as the polymers disclosed by Ninomiya et al. '092 or Akashi et al. EP 669548, in place of the glass substrate exemplified by Berneth et al. WO/9744365 with Elmasry '819 and Savant et al. '221with a reasonable expectation of success based upon the disclosure of equivalent functionality.

2. The Claimed Process is Patentably Distinguishable From the Cited Combination of References

The deficiencies of Elmasry, Berneth et al., Andruzzi et al., Howe et al. and Savant et al. have been presented above and will not be repeated in the interests of conserving the Board's time. Elmasry, Berneth et al., Andruzzi et al., Howe et al. and Savant et al. fail to teach or suggest the instantly claimed invention. Further, Appellants aver that neither Ninomiya et al. nor Akashi et al. supply the missing teaching or suggestion to lead one of ordinary skill in the art to the instant invention.

Ninomiya et al. disclose a method for producing an optical element having a liquid crystal polymer layer capable of reversibly controlling the light scattering

property by an external action (col 1, lines 5-10). The subject matter of Ninomiya et al. is so different from the present process of writing and reading of digital information on a suitable storage medium that Appellants question whether one of ordinary skill in the art attempting to reproduce the instant invention would consult such a reference, much less combine it with those elements selected by the Examiner from Elmasry, Berneth et al., Andruzzi et al., Howe et al., Savant et al.

Akashi et al. provide an optical element made from a polymer liquid crystal composition having an optically anisotropic multi-domain structure which is formed by crosslinking a composition containing a polymer liquid crystal. The multi-domain structure is said to be stabilized by crosslinking, such that the element exhibits excellent reproducibility in restoring white turbidity. As with Ninomiya et al., Appellants query whether one of ordinary skill in the art attempting to reproduce the instant invention would consult such a reference, much less be motivated to combine it with those elements selected by the Examiner from Elmasry, Berneth et al., Andruzzi et al., Howe et al., Savant et al.

Thus, the cited combination of references fails to render obvious Claims 1-5, 7-9, 12-18, 29 and 30 and therefore the rejection under 35 U.S.C. §103(a) should be reversed.

VIII. Conclusions

Therefore, for the reasons set forth above, the rejections of Claims 1-5, 7-9, 12-18, 29 and 30 under 35 U.S.C. §103(a) are erroneous and the Board's reversal of those rejections is respectfully requested.

Respectfully submitted,

By _____
John E. Mrozinski, Jr.
Attorney for Appellant(s)
Reg. No. 46,179

Date of Signature: April 6, 2009

Bayer MaterialScience LLC
100 Bayer Road
Pittsburgh, Pennsylvania 15205-9741
(412) 777-3024
FACSIMILE PHONE NUMBER:
(412) 777-3902
/vjt/jm7059appealbrief

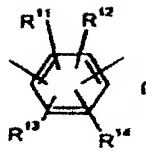
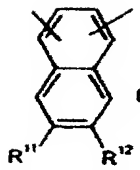
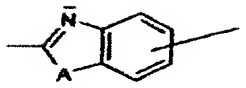
CLAIMS APPENDIX

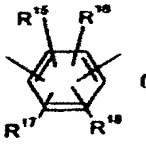
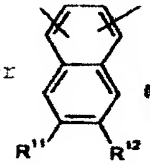
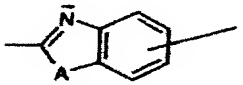
Claim 1 Process for the optical writing and optical reading of digital information in a two-dimensional extended storage medium, the process comprising the steps of:

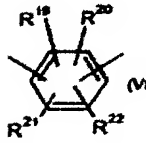
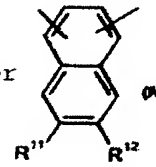
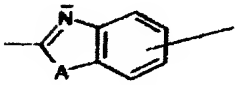
1) modifying by optical writing the surface topography of a storage medium so that a depression of at least 10 nm and a width, measured on the original surface, of less than 10 μm is achieved in one direction, wherein the writing is carried out using a focused laser beam with an energy density of a light pulse between 1 mJ/cm^2 and 100 J/cm^2 and with an intensity of between 0.15 mW and 100 mW, and

2) optically reading the digital information on the storage medium by detecting changes in the surface topography, wherein the reading is carried out with an optical imaging system which can detect interference between beam portions originating from parts of the scanned sample spot lying at different depths, and wherein as light-active polymer films side-chain polymers, optionally block polymers and/or graft polymers are used, to which dyes are bound as side chains via a STQ-spacer (formula I) and dimensionally anisotropic groups are likewise bound via a STQ-spacer (formula II), wherein formula I has the structure

$$—S^1—T^1—Q^1—X^{1'}—Ar^1—(—X^{2'}—Ar^2—)_y—\ (—X^{3'}—Ar^3—)_z—X^4 \qquad (I)$$

where -Ar¹- =  (III) or  (IV) or  (V)

where -Ar²- =  (VI) or  (IV) or  (V)

where -Ar³- =  (VII) or  (IV) or  (V)

in which

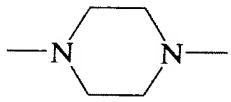
y denotes 1 or 2,

z denotes 0, 1 or 2 and

$X^{2'}$ and Ar^2 and/or $X^{3'}$ and Ar^3 may have different meanings, if y and/or z denote 2,

A denotes O, S or N-C_1- to C_4-alkyl,

Q^1 denotes -O-, -S-, -(N-R^5)-, -C(R^6R^7)$_p$, -(C=O)-, -(O-CO)-, -(NR^5-CO)-, -(SO_2)-, -(O-SO_2)-, -(NR^5-SO_2-)-, -(C=NR^8)-, -(CNR^8-NR^5)-, -O-C_6H_5-COO- or a bivalent radical of the formula



T^1 denotes -(CH_2)$_p$-, wherein the chain may be interrupted by -O-, -NR^9-, or -$OSiR^{10}_2O$- and may be substituted by methyl,

S^1 denotes a direct bond, -O-, -S- or -NR^9-,

P denotes an integer from 2 to 12, preferably 2 to 8, in particular 2 to 4,

R^9 denotes hydrogen, methyl, ethyl, or propyl,

R^{10} denotes methyl or ethyl,

R^{11} to R^{22} independently of one another denote hydrogen or a non-ionic substituent,

X^4 denotes hydrogen, halogen, cyano, nitro, CF_3, CCl_3, -COO-C_1- to C_4-alkyl or $X^{4'}$-R^4,

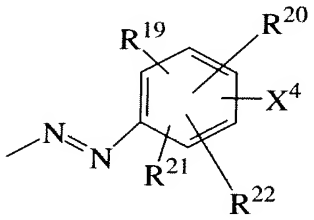
$X^{1'}$, $X^{2'}$ $X^{3'}$ and $X^{4'}$ denote a direct bond, -O-, -S-, -(N-R^5)-, -C(R^6R^7)-, -(C=O)-, -(CO-O)-, -(CO-NR^5)-, -(SO_2)-, -(SO_2-O)-, (SO_2-NR^5)-, or -(CNR^8-NR^5)- and

$X^{2'}$ and $X^{3'}$ may in addition denote -(C=NR^8)-, -(N=N)- and at least one of the groups $X^{2'}$or $X^{3'}$ denotes -N=N-,

R^4, R^5, R^6, R^7 and R^8 independently of one another denote hydrogen, C_1- to C_4-alkyl, or C_6- to C_{10}-aryl and

R^4 and R^5 in addition independently of one another denote C_1- to C_{20}-alkyl-(C=O)-, C_3- to C_{10}-cycloalkyl-(C=O)-, C_2- to C_{20}-alkenyl-(C=O)-, C_6- to C_{10}-aryl-(C=O), C_1- to C_{20}-alkyl-(SO_2)-, C_3- to C_{10}-cycloalkyl-(SO_2), C_2- to C_{20}-alkenyl-(SO_2)- or C_6- to C_{10}-aryl-(SO_2), wherein

by the term non-ionic substituents are understood halogen, cyano, nitro, C_1- to C_{20}-alkyl, C_1- to C_{20}-alkoxy, phenoxy, C_3- to C_{10}-cycloalkyl, C_2- to C_{20}-alkenyl, C_6- to C_{10}-aryl, C_1- to C_{20}-alkyl-(C=O)-, C_6- to C_{10}-aryl-(C=O)-, C_1- to C_{20}-alkyl-(SO_2)-, C_1- C_{20}-alkyl-(C=O)-O-, C_1- to C_{20}-alkyl-(C=O)-NH-, C_6- to C_{10}-aryl-(C=O)-NH-, C_1- to C_{20}-alkyl-O-(C=O)-, C_1- to C_{20}-alkyl-NH-(C=O)-, C_6 to C_{10}-aryl-NH-(C=O)- or a radical of the formula



(VIII)

and the alkyl, cycloalkyl, alkenyl and aryl radicals in turn may be substituted by up to 3 radicals from the group comprising halogen, cyano, nitro, C_1- to C_{20}-alkyl, C_1- to C_{20}-alkoxy, C_3- to C_{10}-cycloalkyl, C_2- to C_{20}-alkenyl or C_6- to C_{10}-aryl, and the alkyl and alkenyl radicals may be straight-chain or branched, and

by the term halogen is understood fluorine, chlorine, bromine and iodine, and formula II is described by

$$—S^1—T^1—Q^1—X^{1'}—Ar^1—(—X^{2'}—Ar^2—)_y—(—X^{3'}—Ar^3—)_z—X^4 \qquad (I)$$

wherein the above substituent definitions (formula I) are also valid for formula II, with the proviso that none of the groups $X^{2'}$ or $X^{3'}$ may denote -N=N- and R^{11} to R^{22} may not denote a radical of the formula (VIII).

Claim 2 Process according to claim 1, wherein polymer films are used as storage medium.

Claim 3 Process according to claim 1, wherein a multi-layer disk is used as storage medium, which comprises at least one mechanically sufficiently stable substrate, at least one polymer film forming the light-active layer, and a covering layer.

Claim 4. Process according to Claim 1, in which a storage medium is used and the light-active layer predominantly comprises oligomers and/or polymers containing dyes that orientate under the action of light.

Claim 5. Process according to Claim 3, wherein a polymer film whose mass density is closely matched to that of the light-active layer is used as covering layer.

Claim 7 Process according to claim 1, wherein the dye side groups I are used, wherein substituents and formulae have the meanings defined in claim 1, and in addition

Ar^1 denotes a radical of the formula (III),

Ar^2 denotes a radical of the formula (VI),

Ar^3 denotes a radical of the formula (VII) or (V),

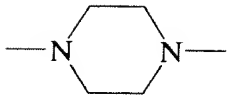
y denotes 1 or 2,

z denotes 0, 1 or 2 and

$X^{2'}$ and Ar^2 and $X^{3'}$ and Ar^3 may have different meanings if y and/or z denote 2,

A denotes O or S,

Q^1 denotes -O-, -(N-R^5)-, -(C=O)-, -(O-CO)-, -(NR^5-CO)-, -(SO_2)-, -(O-SO_2)-, -(NR^5-SO_2-)-, -O-C_6H_5-COO- or a bivalent radical of the formula



T^1 denotes $-(CH_2)_p-$ wherein the chain may be interrupted by -O-, $-NR^9-$, or $-OSiR^{10}{}_2O-$ and may be substituted by methyl,

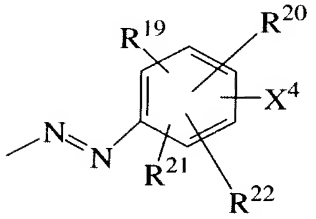
S^1 denotes a direct bond, -O-, -S-, or $-NR^9-$

p denotes an integer from 2 to 8, in particular 2 to 4,

R^9 denotes hydrogen, methyl or ethyl,

R^{10} denotes methyl or ethyl,

R^{11} to R^{22} independently of one another denote hydrogen, halogen, cyano, nitro, C_1- to C_{20}-alkyl, C_1- to C_{20}-alkoxy, phenoxy, C_3- to C_{10}-cycloalkyl, C_2- to C_{20}-alkenyl, C_6- to C_{10}-aryl, C_1- to C_{20}-alkyl-(C=O)-, C_6- to C_{10}-aryl-(C=O)-, C_1- to C_{20}-alkyl-(SO_2)-, C_1- to C_{20}-alkyl-(C=O)-O-, C_1- to C_{20}-alkyl-(C=O)-NH-, C_6- to C_{10}-aryl-(C=O)-NH-, C_1- to C_{20}-alkyl-O-(C=O)-, C_1- to C_{20}-alkyl-NH-(C=O)-, C_6- to C_{10}-aryl-NH-(C=O)- or a radical of the formula



(VIII)

X^4 denotes hydrogen, halogen, cyano, nitro, CF_3, CCl_3, -COO-C_1 to C_4-alkyl or $X^{4'}$-R^4,

$X^{1'}$, $X^{2'}$ $X^{3'}$ and $X^{4'}$ denote a direct bond, -O-, -(N-R^5)-, -C(R^6R^7)-, -(C=O)-, -(CO-O)-, -(CO-NR^5)-, -(SO_2)- or (SO_2-O)- and

$X^{2'}$ and $X^{3'}$ may in addition denote -(N=N)- and at least one of the groups $X^{2'}$ or $X^{3'}$ denotes -N=N-,

R^4, R^5, R^6, R^7 and R^8 independently of one another denote hydrogen, C_1- to C_4-alkyl, or C_6- to C_{10}-aryl and

R^4 and R^5 in addition independently of one another denote C_1- to C_{20}-alkyl-(C=O)-, C_3- to C_{10}-cycloalkyl-(C=O)-, C_2- to C_{20}-alkenyl-(C=O)-, C_6- to C_{10}-aryl-(C=O)-, C_1- to C_{20}-alkyl-(SO_2)-, C_3- to C_{10}-cycloalkyl-(SO_2)-, C_2- to C_{20}-alkenyl-(SO_2)-, or C_6- to C_{10}-aryl-(SO_2)-.

and dimensionally anisotropic side groups II are used wherein substituents and formula have the meanings defined in claim 1, and in addition

Ar^1 denotes a radical of the formula (III),

Ar^2 denotes a radical of the formula (VI),

Ar^3 denotes a radical of the formulae (VII) or (V),

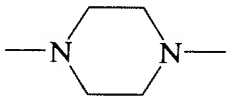
y denotes 1 or 2,

z denotes 0, 1 or 2 and

$X^{2'}$ and Ar^2 and/or $X^{3'}$ and Ar^3 may have different meanings if y and/or z denote 2,

A denotes O or S,

Q^1 denotes -O-, -(N-R^5)-, -(C=O)-, -(O-CO)-, -(NR^5-CO)-, -(SO_2)-, -(O-SO_2)-, -(NR^5-SO_2-)-, -O-C_6H_5-COO- or a bivalent radical of the formula



T^1 denotes -$(CH_2)_p$-, wherein the chain may be interrupted by -O-, -NR^9-, or -$OSiR^{10}{}_2O$- and may be substituted by methyl,

S^1 denotes a direct bond, -O-, -S-, or -NR^9-

p denotes an integer from 2 to 8, in particular 2 to 4,

R^9 denotes hydrogen, methyl or ethyl,

R^{10} denotes methyl or ethyl,

R^{11} to R^{22} independently of one another denote hydrogen, halogen, cyano, nitro, C_1- to C_{20}-alkyl, C_1- to C_{20}-alkoxy, phenoxy, C_3- to C_{10}-cycloalkyl, C_2- to C_{20}-alkenyl, C_6- to C_{10}-aryl, C_1- to C_{20}-alkyl-(C=O)-, C_6- to C_{10}-aryl-(C=O)-, C_1- to C_{20}-alkyl-(SO_2)-, C_1- to C_{20}-alkyl-(C=O)-O-, C_1- to C_{20}-alkyl-(C=O)-NH-, C_6- to C_{10}-aryl-(C=O)-NH-, C_1- to C_{20}-alkyl-O-(C=O), C_1- to C_{20}-alkyl-NH-(C=O)-, or C_6- to C_{10}-aryl-NH-(C=O)-,

X^4 denotes hydrogen, halogen, cyano, nitro, CF_3, CCl_3, -COO-C_1 to C_4-alkyl or $X^{4'}$-R^4,

$X^{1'}$, $X^{2'}$ $X^{3'}$ and $X^{4'}$ denote a direct bond, -O-, -(N-R^5)-, -C(R^6R^7)-, -(C=O)-, -(CO-O)-, -(CO-NR^5)-, -(SO_2)- or (SO_2-O)- and

R^4, R^5, R^6, R^7 and R^8 independently of one another denote hydrogen, C_1- to C_4-alkyl, or C_6- to C_{10}-aryl and

R^4 and R^5 in addition independently of one another denote C_1- to C_{20}-alkyl-(C=O)-, C_3- to C_{10}-cycloalkyl-(C=O)-, C_2- to C_{20}-alkenyl-(C=O)-, C_6- to C_{10}-aryl-(C=O)-, C_1- to C_{20}-alkyl-(SO_2)-, C_3- to C_{10}-cycloalkyl-(SO_2)-, C_2- to C_{20}-alkenyl-(SO_2)-, or C_6- to C_{10}-aryl-(SO_2)-.

Claim 8 Process according to Claim 1, wherein the storage medium on which information is to be written has a light-active layer of a thickness between 0.05 and 1000 µm.

Claim 9 Process according to Claim 1, wherein the storage medium that is used has an optical density at the wavelength of the writing laser of the light-active layer of between 0.3 and 20.

Claim 12. Process according to Claim 1, wherein the change in the surface topography of the storage medium is produced by laser light having wavelengths between 380 nm and 820 nm.

Claim 13 Process according to Claim 1, wherein the light has an intensity of between 150 µW and 100 mW and is focused on spots having a dimension (full half-value width) in a range between 10 nm and 8 µm.

Claim 14 Process according to Claim 1, wherein information can be written on storage media whose carrier layer comprises a polymer.

Claim 15 Process according to Claim 1, a signal deviation is written in the storage medium having at least a carrier/noise ratio of 20 dB.

Claim 16 Process according to Claim 1, wherein information can be written on storage media that contain, between the light active dye-containing layer and the covering layer, an additional, light-reflecting layer selected from the group consisting of aluminum, silver, and gold.

Claim 17 Process according to Claim 1, wherein the storage medium on which information is to be written has no reflecting layer.

Claim 18 Process according to Claim 1, the optical writing process is performed with polarised light of variable intensity, produced by a laser with an acousto-optical modulator or by modulation of a laser diode, and the polarisation state of the reflected light is detected in a polarisation optics system.

Claim 29 The storage medium prepared by the method of Claim 18.

Claim 30 The process of Claim 1 wherein said reading is carried out without substantial portions of the detected signal resulting from a degradation and/or a physical or chemical modification of the areas adjacent to the absorber layer.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.